The consequences of issuing convertible bonds: Dilution and/or financial restructuring?

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Dilution and/or Financial Restructuring?[1]

Abstract

Historically, most convertible bond (CB) issues have been converted to equity sooner or later. The announcement of a CB issue will bring about a future dilution of the firm's capital, and is often followed by a drop in share price. However, a CB issue by itself creates future value for the shareholders if it enables the firm to make profitable investments. It can also issue a positive signal regarding the restructuring of the firm's financial liabilities and its attempts to optimise its financial structure. These positive effects, if they occur, will develop gradually after the issue, and cannot be identified by a simple short-term event analysis of a CB issue announcement. In this paper, we test the significance of the dilution effect, coupled with a possible value creation effect, using data from the French stock market. We introduce a comparison between dilutive convertibles and non-dilutive exchangeable bonds. By integrating different corrections and by selecting a window of analysis over a longer period after the announcement of the issue, we show that the negative cumulative average abnormal returns generally observed in previous studies become non-significant. This absence of global incidence is indicative of large differences in individual behaviour by issuers of CBs, and leads us to take into account the strategic choices linked to the issue of a CB. Two goals, often described as 'investment financing' or 'financial restructuring', may exist when issuing, and may appear to explain the size of the abnormal returns.

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Introduction

Since the end of the 1960s, convertible bonds (CBs) have had great success and, to this day, still represent a significant part of continental European stock exchange capitalization.[2] However, the issuing of CBs has often occurred in waves. At certain times, when the underlying share prices have risen, many CB issues have appeared. At other times, the market for CBs has been relatively inactive. Such was the case in 2001-2002 when the internet stock market bubble burst, bringing about a general stock market correction. Alternatively, rising stock prices or more favourable forecasts may bring about a renewed interest in CB issues. This happened in 2003-2004, with a significant surge of CB issues on the French and European stock exchanges. These regularities explain the timing of CB issues by taking profit from high stock prices. Therefore, CB issues would give a short-term signal of stock price overvaluation.

Share price will normally drop following the announcement of a CB issue because it signals the future dilution of the firm's capital. The purpose of this paper is to go beyond the immediate consequences of the issue of CBs on the stock price, which have been extensively documented. We investigate the motivation of the issuing firm and the timing of an issue. Historically, most CBs have been issued with the expectation of being converted to shares sooner or later. Because of their medium-term debt leverage ratio, CBs are considered deferred stocks. Investors, through the issuing firm, generally gamble on a future rise in the share price. A CB issue, by itself, creates future value for the shareholders if it enables the firm to make other profitable investments. It can also be a positive signal regarding the restructuring of a firm's financial liabilities and the optimisation of its debt structure.

[2] In 2007, 41 French convertible bonds with a significant outstanding nominal value (above 15 million euros) were publicly listed on the Paris Euronext stock market. Their outstanding market value is worth 18 billion euros compared to a total stock capitalization of 1841 billion euros at the Paris Bourse (data from Exane on 05/07/07, www.exane.com). The French convertible bonds market is an order driven market with transactions cleared within the stock exchange. Only some international convertible bonds, mostly denominated in dollars, are traded on the OTC market.

We need to take into account the alternative economic rationales an investor might consider at the CB issue date. Three simple scenarios regarding a CB issue present themselves. In the first scenario, the CB issue is used only to reimburse an existing debt. In the case of a conversion, it will improve the debt ratio of the firm and keep its assets unchanged. Such a CB issue is then purely dilutive because the prospect of an increase in the firm's value remains the same but is shared between more stocks. The probability of conversion is then lowered due to dilution. The decrease in debt leverage is important because the transfer of funds to equity, in the case of conversion, decreases the debt ratio[3]. Improvement of the financial structure creates some value for shareholders with a lower expected rate of return on equity, which may totally or partially balance the mechanical dilution effect.

In the second scenario, the CB proceeds are invested and serve to enlarge the firm's assets and expected economic profits. Dilution occurs immediately and appears more or less counterbalanced by profits in equity[4], depending on the unknown profitability of the new investments. In medium-term view, the leverage ratio is lowered after conversion and thus creates value for all shareholders.

Finally, in the third scenario, the leverage ratio remains unchanged as CBs are assimilated into capital equity and induce new debts. The amount invested is then increased by the leverage factor and, if investments are profitable, the dilution effect may be null and a net creation of value may follow the CB issue[5]. In the no dilution scenario, the expected economic return of new investments is the critical figure. Thus, a balancing mechanism may

[3] The effect is in fact doubled in a no investment scenario. For example, in a firm with 500 in equity capital and 500 in debt, a pure CB issue of 100, which is assumed to reimburse a current debt and is later converted, lowers the leverage ratio from 1 to 0.67. The net worth of the firm is diluted by 20%.

[4] In that scenario, using the example given in the previous footnote, the leverage ratio declines from 1 to 0.83 as far as the net worth of the firm after conversion is 600 and the debt remains at 500.

[5] Taking the same example, in that scenario the firm maintains its leverage ratio at 1 and invests 200 in new assets through a CB issue of 100 and a new debt of 100.

occur between dilution on one hand, and financial decisions linked with a CB issue in terms of both investment and/or debt restructuring, on the other. Outside shareholders face a situation of asymmetric information in that they do not know which scenario exists. They can only guess at the existence of a dilution effect and speculate as to the investment/financing policy behind the CB issue.

If CB effects are on the whole positive, and take place in a context of asymmetric information for the outside shareholders, they will only gradually become perceptible as the firm evolves. What will the firm do with the funds received? Will the leverage ratio be lowered? These questions cannot be answered by a simple short-term impact analysis of a CB issue announcement. Rather than analyse the event for only a few days immediately following it, it seems preferable to analyse the consequences over a longer period, for instance six months. This larger window allows the strict and immediate mechanical dilution impact of a CB issue to pass, and creates an opportunity to investigate the uncertain motivation of the company in issuing CBs: investment financing and/or financial restructuring.

This article shows the importance of relevant correction mechanisms to go beyond the short-term simple hypothesis of an immediate signaling effect. We test the significance of a dilution effect coupled with a possible value creation effect using data from the French stock market. A medium-term post-event window is used to analyse the future economic and financial choices of the firm. We propose corrections in the measurement of abnormal returns after issuance due to (i) a change in the leverage structure and (ii) the potential limits on dilution. Finally, we provide a comparison between dilutive convertibles and non-dilutive exchangeable bonds (EBs). We show that the negative cumulative average abnormal returns generally observed in previous studies are no longer statistically significant. This absence of global incidence is consistent with large differences in the individual behaviour of issuers of

CBs. By relating abnormal returns to a firm's characteristics, we argue that the specific use of the capital raised is crucial in understanding the impact that the convertible-bond issuance has on stock prices.

The paper is organized as follows. Section 1 offers a synthesis of the literature covering the theoretical justifications of CB issues and the main empirical reactions of the underlying stock markets to this type of issue. Section 2 reviews the methodologies used and the results of an analysis of the French stock market reaction to CB and EB issues. A conclusion follows.

1. CB Issues and Underlying Stock Market Reactions: Theoretical Justifications and Empirical Evidence

1.1 The logic behind a CB issue

For the firm's management, as confirmed by Hoffmeister (1977) and Billingsley and Smith (1996), the main justification for a CB issue is to raise new equity capital. Nercy (1997) and Kenigswald (2003) also state that this motivation is stronger during an upward market; CBs issued during these periods benefit from higher price levels. During periods when the stock market is moving downwards, the desire to defer a CB issue is at odds with the desire to lighten the debt load. This latter desire has two aspects. The first is to increase debt at a lower cost compared to the current cost of a standard bond. The second, compatible with the first, is to improve the debt structure since analysts consider a CB issue to be a form of equity capital in their assessment of the firm's financial structure. Bancel and Mittoo (2004) study financial officers to determine the reasons why European firms undertake a CB issue. A very large majority of chief financial officers (CFOs) – 86% – considered CBs to be a deferred issue of shares involving some dilution. At the same time, looking at the near future, 50% of these managers believed that a CB issue avoids short-term dilution for the shareholders, and only

23% thought that a CB issue improves the firm's debt ratio. More recently, Dutordoir and Van de Gucht (2008) find that European convertibles are often used as sweetened debt, not as delayed equity.

The financial literature identifies three major justifications for a CB issue: (i) reduction of agency costs, (ii) reduction of costs associated with asymmetric information, (iii) solving a problem of sequential financing.

(i) First, as soon as one questions the framework of Modigliani and Miller (1958, 1963) (i.e., identical information and no conflict of interest) one must consider agency costs. Here, we should make a distinction between the agency costs generated by the conflict of interest between shareholders and creditors and those generated by the conflict of interest between shareholders and management.

Following Galai and Masulis (1976), who emphasise the divergent interests of shareholders and creditors in the case of a variation of the firm's risk, Green (1984) highlights the advantage of a CB issue over a standard loan. The conversion rights of CB holders enable them to become shareholders, if this is in their interest. Thus, a CB issue discourages excessive shareholder remuneration. In such a situation, CB holders may exercise their conversion rights, leading to the dilution of the amount distributed to the shareholders. In addition, CB holders are better protected against the effects of any attempt to increase the firm's risk. The costs associated with the remuneration of a standard bond are higher in proportion to the importance of the market's perception of the firm's risk. Conversely, since a CB is equivalent to a debt combined with a share purchase option, if the market perceives an

increase in the firm's risk, the reduction in the debt value is partially compensated by the increase in the value of the call option due to higher volatility.

In the framework of asymmetric information, Jensen (1986) clearly shows the importance for shareholders of establishing a 'costly' surveillance procedure to ensure that management really acts in their interest. Thus, increasing debt allows the firm not only to reduce 'free cash flow', which might attract opportunist managers, but also forces the latter to be rigorous in assuming the loan's repayments[6]. In this context, a CB issue again appears to be another way to reduce agency costs. The CB contributes to a reduction in the 'free cash flow' as a standard debt. It also requires management to increase the share value for a limited period, thus inciting conversion by the debt holders so as to avoid reimbursing them at the term of the issue.

(ii) Second, concerning asymmetric information, 'signaling' theory (as introduced by Ross (1977) or Leland and Pyle (1977)) is based on the idea that some choices made by management can be interpreted as a signal for the firm's outside investors. For example, a higher level of debt can represent a signal of management confidence in the firm's results and good health. In the context of asymmetric information between management and shareholders, Myers and Majluf (1984) develop a hierarchical theory of the firm's financing choices ('pecking order'): first are retained earnings, followed by the issue of standard debt, then risky debt, and lastly, the issue of equity capital. Management should follow this funding hierarchy so as to minimize the transfer of value during these issues from the older shareholders toward the new investors. The firm's announcement of an equity issue would cause a negative market reaction, which is due to the perceived overvaluation of the stock on the market. A CB issue is considered deferred capital and is then associated with a negative

[6] The debt also results in agency costs brought on by the increase in the risk of bankruptcy, by taking into account the risk of asset substitution (Jensen and Meckling, 1976), and even by the possibility of underinvestment (Myers, 1977).

signal of overvaluation. Negative announcement effects, as identified on the stock market at the issue date, have largely been interpreted as consistent with an overvaluation explanation.

However, a CB issue can also result in the reduction of certain costs. Thus Stein (1992), in his 'backdoor equity' theory, presents the CB issue as a technique to indirectly raise new capital when the asymmetry of information is such that a direct share issue is unfavourable and the costs of failure are high. The underlying idea is relatively simple; the lower interest rate for CBs relative to standard debt issue (due to the convertible option value associated with CBs) permits management (who anticipate a rise in the share price) to reduce the cost of debt and to subsequently raise new capital at a more attractive price. If asymmetric information exists about the firm's risk level, particularly between management and investors, Brennan and Schwartz (1988) indicate that the divergence can be reduced by a CB issue. When an increase in the firm's risk is anticipated by the market, CB holders should not require a higher remuneration of the debt. In fact, they will benefit from this eventual risk increase via the call option value incorporated into a CB. If the securities (CB and straight debt) are fairly priced, the issue of CBs would mitigate the risk shifting / asset substitution problem (Green, 1984), but would aggravate the effort moral hazard problem (Jensen and Meckling, 1976). Innes (1990) underscores that straight debt, by imposing higher cash out-flows, is more efficient in disciplining managers and minimizing the agency problem.

(iii) Finally, Mayers (1998) considers the solution that a CB issue can offer to the problem of sequential financing. His analysis is similar to that of Schultz (1993), who justifies the consecutive issues of subscription warrants and new shares, or to that of Sahlman (1990), who outlines the opportunity for the 'venture capitalist' to subscribe to shares in a sequential manner. Mayers gives the example of an investment project A, which is ex ante profitable because of a growth option, or a future investment in a later project B, with profitability and

eventual realization that cannot be known until the end of project A. The problem consists of financing the two projects by minimizing the issue costs as well as those associated with an over-investment in a situation of a useless 'free cash flow'. The conversion of a CB (with a maturity equal to that of project A) is interesting only if project B is realized. Such a CB issue is in fact superior to the strategy of issuing standard debt at the start of each project with maturity equal to the respective terms of the two projects, meaning two costly issues if the investment option is realized.

If project B is not realized due to market conditions, the investment option associated with project A becomes valueless, and thus non-profitable. The price of the firm's shares remains below the limit necessary for the CB conversion. At this point, the holders opt for reimbursement at face value, while being careful to avoid the risk of over-investment. If project B is realized, then project A becomes profitable due to the exercise of the investment option. The share price will then reach the limit for forcing the CB conversion, and the firm will keep the necessary cash to finance project B. In summary, by carefully choosing the conversion opportunity, the issue of a CB optimises the sequential financing of profitable investment options.

1.2 Market reactions to the announcement of CB issues

In the light of the above theoretical justifications for CB issues, we will now focus on the main findings of empirical studies testing the reactions of a number of stock markets (specifically, the United States, Japan, Germany, Switzerland, the Netherlands, the United Kingdom, and France) to the announcement of CB issues. Just as studies have measured the stock market effects of the dilutive/overvaluation signal of new share issues (for example, Asquith and Mullins, 1986) , many empirical studies have also been devoted to CB issues. In

fact, this hybrid form of financing often causes a negative reaction in the underlying share market, but one that is less significant than with a standard share issue.

Thus, even though these empirical studies differ in time periods, choice of announcement date, size of the CB issue, chosen event methodology, window around the announcement date and placement techniques for each market, significant negative statistical reactions are observed in most studies. Most results are obtained from the calculation of abnormal short-term returns using periods comprising only a few days, and most often immediately following the announcement date of a CB issue (cf. Table 1).

INSERT Table 1

In addition to the surprising and contradictory results from the Netherlands and Japan in Table 1, the market's negative reaction to CB issues appears more closely related to a reaction caused by share issues than one caused by standard bond issues. This underperformance generally remains significant when considering long-run analysis of stock returns following CB issues. These findings are also consistent with Spiess and Affleck-Graves (1999) for the US; Kang, Kim and Stulz (1999), and Cheng, Visaltanachoti and Kesayan (2005) for Japan; and Abhyankar and Ho (2006) for the UK. Recently, Chang et al. (2007) examined a long-term period after the issue of CBs in Taiwan. They showed an average negative abnormal return of between –16% to -26% over the three-year period following the event. When significant, underperformances (calculated on a yearly basis) range from –3% to -8% [7]. Even if this tends to confirm the motivation of 'raising deferred capital' inherent in most CB issues, Abhyankar and Ho (2006) point out that the significance of the negative abnormal performance decreases or vanishes when using a conditional asset pricing model rather than a

[7] For a summary of main results in recent studies using data from the US and Japan, see Abhyankar and Ho (2006), p. 100, Table 1.

classical buy-and-hold abnormal performance return analysis. Thus, estimates of long-term abnormal returns seem to be very sensitive to the methodology selected to adjust for risk, and are not necessarily a stylised feature of the data. At the same time, frequent use of early reimbursement clauses (or call provisions) confirms the importance of 'raising deferred capital' for the firm's management. In this context, Davidson, Glascock and Schwarz (1995) observe that the conversion prices used in the American convertibles market are generally not high and that the expected conversion period is short—less than 18 months.

At first glance, this negative market reaction conforms to the hypothesis of asymmetry of information, as well as to the Myers and Majluf (1984) 'pecking order theory' and to the Stein (1992) theory of 'backdoor equity'. However, several empirical studies offer more discriminating results using samples of any type of issue (stocks, CBs, etc.) or samples identifying only CBs. These studies include those carried out by Smith (1986), Kuhlman and Radcliffe (1992), Brennan and Her (1993), Davidson, Glascock and Schwarz (1995), Jung, Kim and Stulz (1996) and Lewis, Rogalski and Seward (1999) for the US market and by Burlacu (2000) and Ducassy (2003) for the French market. First, the market reactions to all issues (shares, CBs and standard debt) confirm, in particular, the 'pecking order theory'. Second, specific reactions to CB issues are even more negative when the 'conversion to shares' component is strong in the market. Using a sample that differentiates standard CB issues from those of French OCEANE bonds, Ducassy (2003) observes that the French market's negative reaction on the day of issue for OCEANEs (i.e., bonds that borrowers, when the conversion option is exercised, can either issue new shares or buy existing shares in the market) becomes positive after a few days[8]. This highlights the fact that the dilution effect appears to be stronger than the standard overvaluation explanation.

[8] Typically, an OCEANE contains an option on dilution.

The market's negative reaction to a CB issue also conforms to the agency theory referenced by Green (1984), concerning the conflict between shareholders and bondholders. In fact, the dilution effect linked to the CB holders' exercise of the conversion option can explain this reaction. By contrast, it is much more difficult to justify the negative market reaction to a CB issue using the logic of sequential financing or the reduction of agency costs generated by the conflict of interest between management and shareholders. However, evidence that the negative reaction to CB issues is generally lower than the negative reaction to the issue of shares can also be seen as shareholders having a positive perception of the disciplinary effect of the debt component of CBs (Jensen, 1986).

In parallel with the generally negative market reaction to CB issues, we can also mention other empirical studies attributing the market reaction according to various specific variables. Following the work initiated by Eckbo (1986) or Mehta and Kahn (1995) in the US market, Ducassy (2003) points out that the French market reaction depends on the use of funds received from the CB issue. This reaction is very negative when future investments are announced, but it becomes non-significant when it is a matter of financial restructuring (lowering the debt ratio). This suggests that the use of CBs to raise capital equity is a favourable signal for the market (i.e., management expects a quick conversion following a forecasted rise in the share value).

The firm's size does not appear to be a significant factor in the market's reaction to a CB issue (see, in particular, Lewis, Rogalski and Seward (1999) for the US market; Abhyankar and Dunning (1999) for the UK market and Ducassy (2003) for the French market). The firm's risk, whether it is measured by the beta (Mehta and Kahn, 1995) or by the volatility of return (Lewis et al., 1999), results in market reactions that are magnified for the US market and unchanged for the French market (Ducassy, 2003). Just as Lewis et al. (1999) observe in

the US market, Ducassy (2003) finds that a high level of debt in the year preceding the issue has a positive effect on the size of the French market's reaction. This result fits the theoretical contribution of Stein (1992), which shows that an indebted firm has interest in a CB issue only if its management is optimistic about the evolution of its share value, and the subsequent reduction in debt after conversion. Finally, Ducassy (2003) validates the model proposed by Lucas and McDonald (1990), who state that the market reaction to an issue is more unfavourable when the prior rise in the share price is significant. She observes that CBs issued during a rising market elicit more severe negative reactions in the French market. In such a context, investors are more sensitive to a fear of overvaluation of stocks.

2. The French Market Reaction to the Issue of Convertible and Exchangeable Bonds

Our empirical study intends to focus more on the motivations and the consequences of convertible and exchangeable bond issues than previous studies. In particular, its aim is to analyse the French stock market reaction to the issue of these types of financial instruments. Previous studies have typically focused on events in the short term, before and after the issue, and have often identified abnormally negative results. However, by taking into account possible corrections within a larger window of investigation around the issue date, we can expect to capture the presence of multiple effects, sometimes positive but often negative (dilution, overvaluation signaling, etc.), that are not foreseen at the time of the issue. It is therefore important to determine which effects prevails. This last point also leads to implications concerning portfolio management.

2.1 Sample and methodology

A sample of 59 CBs issued on the French market between 1996 and 2003 is studied. They are selected from Exane's convertible database, each with a minimum outstanding nominal value

of 100 million euros to avoid liquidity problems. Two sub-samples were created by separating CBs from exchangeable bonds (EBs). The first are bonds that allow conversion into shares of the issuing firm itself according to a contractual conversion ratio. The 43 CB issues entail a potential effect of capital dilution. In order better to analyse dilution, 16 exchangeable bonds (EBs) were considered. These are bonds a firm issues that can be converted into shares of another firm. The latter are usually linked to the former, either within a group (parent firm, associated firm, affiliate, etc.), or outside the group[9]. Under such circumstances, the issue is 'backed' by the existence of a controlling block of shares. Furthermore, there is no dilution effect because there is no issue of new shares. Although there are only a few of them in the sample, EB issues can be used as a benchmark to test the importance of the dilution effect for CB issues.

The characteristics of the sample are shown in Table 2. The average outstanding value is high, amounting to 739 million euros. Also shown are the characteristics of the firms from which stocks can be obtained (i.e., the issuing firms for CBs and the 'target' firms for EBs). These show comparatively high book leverage ratios (on average, 1.57). However, the debt leverage calculated on the market equity value at issue has, on average, a more standard value of 0.82. The issue of CBs/EBs results in a potential strengthening of the equity capital and, therefore, involves a subsequent reduction in the debt leverage where there is a total and immediate conversion into shares. In this case, the book debt ratio decreases by -0.49 and the market value-based debt ratio decreases by -0.10[10].

Insert Table 2

[9] For example: with a view toward reducing blocks of participation, particularly in Germany.

[10] The largest reduction in book ratios is due to the fact that a CB issue is based on the market value of shares at the moment of issue plus a premium. Since the price of shares is higher than their balance sheet value, the firm's accounting net worth is thus re-valued after the issue.

Our sample shows that in an EB issue, a controlling investor will place an average stake of 5% of the target firm's equity on the market. For CBs, the mechanical dilution following the issue and the creation of new shares represents an average of 10% of the capital, resulting in an average dilution ratio of 0.91.

The daily share values, as posted by Bloomberg, were recorded around the announcement date of the CB issue[11]. Eliminating holidays, we took the closing prices of the 164 days (approximately seven calendar months) preceding the CB issue. We then followed the share prices for six months after the issue. We considered a total period [*d*-163, *d*+122] (*d* being announcement date of the issue) for the stock returns.

We used an estimation window L1 of 146 daily returns for the market model (i.e., *d*-163 to *d*-18, approximately six and a half months). The daily returns were calculated as the differences in the price logarithms. To avoid the problem of the variability of beta coefficients in the market model over a longer period (Simon, 1986), we selected a relatively short estimation window L1. Estimation periods of different lengths from the L1 window of 146 days were also tested: a longer period of 219 days (10 months) and a shorter period of 73 days (three months). Periods that are too long can yield out-of-line beta parameters because the firm's strategy and risk can change over time. Windows before the event that are too small can lead to an insufficient number of observations and low quality estimates. The problem of the stability of beta estimates is addressed by analysing the cumulative average abnormal returns obtained through the three different estimation windows. Although we favoured the L1 window of 146 days, all three windows yielded similar findings; the results from the longer and the shorter windows are also presented below.

[11] We checked the sample of issues to verify that prices were not affected by parasite information published during the period of investigation around the issue date.

By choosing a six-and-a-half month period to estimate the beta coefficients, this study differs from previous ones, which have generally focused on shorter periods and had a lower number of estimate points. It was deemed preferable to interrupt the window of estimate 17 days before the official announcement of the issue, so as to counterbalance a minimum period of three weeks before the opening of the issue. Organizing a large issue of CBs is a somewhat long and complex task. There is a risk that, in the final days before the issue becomes public, the financial press or analysts will learn of it. We estimate the market model parameters as:

$$R_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{Mt} + \varepsilon_{it} \qquad \forall t = d-163,...,d-18 \tag{1}$$

The CAC 40 market index[12] is used, and the market model estimates for period L1 are then used to generate the abnormal daily returns over test period L2. The six and half months test period L2 is similar to the length of L1, and enables us to measure the consequences over a longer horizon. The aim is to integrate the possible anticipation and appreciation by the market regarding changes in the firm's behaviour. For example, we took into account the forecast of new investments that may result from the use of the funds raised by the CB issue. Shorter-term windows consisting of the few days following the issue cannot take into account a firm's future financing or investment decisions. A medium-term abnormal performance analysis is performed and includes the two-week period prior to the formal public announcement of the issue to the market. These two weeks would take into account the possible dissemination of information to financial intermediaries and banks involved in the issuing syndicate.

[12] Most firms in the sample were or are still part of the CAC 40. In general, they are large firms. Thus, our use of the CAC 40 index seems justified, and is confirmed in further tests when the CAC 250 index was used.

Long-term analysis of abnormal performances was questioned by Fama (1998) because using extrapolated values to estimate expected returns leads to a poor description of the patterns of average returns. Risk premiums can change and statistical inferences can be biased over a long-term horizon of three to five years after the event. This problem can be handled either by using a long-term comparison with a paired sample of similar stocks and calculating buy-and-hold abnormal returns, or by using an asset-pricing model to estimate expected returns. Long-term horizons were specifically developed to analyse the consequences of seasoned equity offerings (SEOs). They have previously been used, for example, on US data by Eckbo et al. (2000) and Jegadeesh (2000), and on UK data by Levis (1995) and Ho (2004). Long-term horizons are also necessary to see the consequences of mergers or acquisitions on performance. Agrawal et al. (1992) considered a time horizon of five years after the public offering. Gregory (1997) analysed a period of two years using UK market data, and Pecherot-Petit (2005) considered a period of three years on French data.

An alternative method for assessing abnormal returns over a long-term period after an event is the calendar time portfolio regressions (CTPRs) analysis proposed by Mitchell and Stafford (2000). It follows the average monthly return of a portfolio of underlying stocks of firms issuing EBs or CBs over a post-event period of 1 to 3 years. The average abnormal return during the post-event period is the intercept of the time series calendar portfolio regressed on the Fama and French three-factor model. This methodology is often used to analyse long-term benefits following from acquisitions. Essentially, long-term post-event studies assume that the stock prices are not contaminated by further evolution. Financing decisions, such as the issue of CBs, generally occur in a stream of many financial and economic choices. This leads to privilege medium-term post-event periods. Our medium-term horizon of six months goes far beyond the ‘long-term’ horizons typically identified in the literature. It allows us to check whether post-event stock prices remain unpolluted by other major financial or economic

decisions. In particular, it allows for the possibility that the standard deviation of residuals from the estimated market model window might remain the same over the subsequent L2 window. Using a 140-day period from *d*-17 to *d*+122, we calculated the abnormal returns in the usual manner:

$$AR_{it} = R_{it} - \left(\hat{\alpha}_i + \hat{\beta}_i R_{Mt}\right) \qquad \forall t \; d-17 \le t \le d+122$$

The average abnormal return, AAR, on the number of considered events *N* is

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \quad \forall t \; d-17 \le t \le d+122 \tag{2}$$

We calculate the cumulative average abnormal returns (CARs) beginning with the lower bound of L2 set at *d*-17, t_1:

$$CAR(t_1,t) = \sum_{j=t1}^{t} AAR_l \text{ for } d\text{-}17 \le t \le d+122 \tag{3}$$

The variance of cumulative returns can be written as[13]:

$$Var\left(CAR(t_1,t)\right) = \frac{1}{N^2}(t-t_1+1)\sum_i \sigma_i^2 \tag{4}$$

where σ_I is an estimate of the standard deviation of stock returns *i*, which results from market model (1) on the L1 period.

[13] Estimate (4) is only valid if L1 is large enough. Then the sampling error effect of the parameters disappears. Here we have a medium-term window of 146 observations.

To test the hypothesis of null cumulated abnormal returns, we calculated the following statistic, which asymptotically follows a normal distribution:

$$\frac{CAR(t_1,t)}{\left(Var\left(CAR(t_1,t)\right)\right)^{1/2}} \sim N(0,1) \qquad (5)$$

For smaller samples, the previous statistic is a t-Student with N-1 degrees of freedom. The estimation of abnormal returns based on the market model is exposed to possible errors of estimation resulting due to use of an incorrect model[14]. We also crossed the previous parametric tests with a non-parametric statistic, as suggested by Campbell, Lo and MacKinlay (1997)[15]; this complementary specification allows us to check the problem of specification of the normal returns model. The following variable was calculated at each day of the L2 period:

$$\left[\frac{N^+}{N} - 0.5\right]\frac{N^{\frac{1}{2}}}{0.5} \sim N(0,1) \qquad (6)$$

where N^+ represents the number of cases of positive abnormal returns in the post-event period.

This statistic tests the hypothesis that the percentage of positive cumulated abnormal returns is 0.50 (assuming independent abnormal returns across stocks). A rejection of the null hypothesis shows that the issue had a positive impact on the abnormal returns. The sign test statistic is asymptotically normally distributed. The assumption that the abnormal returns are distributed normally is important because the sign test is not adapted to an asymmetrical

[14] We also used a constant mean-return model to get abnormal returns over the L2 window. That model simply states that the returns are constant, so equation (1) becomes: $R_{it} = \mu_i + \varepsilon_{it}$. The abnormal returns over the L2 window are estimated using $\hat{\mu}_i$. The CAR tests are the same as the previous ones. Brown et al. (1985) highlight the fact that the results from the constant mean model are often similar to those arising from more sophisticated ones (see Campbell et al., 1997, p.154).

[15] See reference, p. 160-172.

distribution of data. We checked the skewness and the kurtosis of the individual abnormal returns and verified whether the series of abnormal returns over the L2 window followed a normal distribution. The Bera-Jarque test confirmed that the distribution of abnormal returns did not differ from normality.

Finally, we tested the assumption that there was no clustering. The aggregation of variance above stocks using equation (4) assumes that there is no cross correlation between the abnormal returns of individual stocks. Such a situation can occur when the event windows of individual securities overlap. We calculated the number of overlapping pairs of abnormal returns series. For the EB sample (16 stocks), there were 17 pairs of partially overlapping abnormal returns out of a total of 120 pairs (14.6%). Looking at the CB sample (43 stocks), we found 117 pairs of partially overlapping pairs out of 903 total pairs of stocks (13.9%). Assuming the overlapping pairs overlap halfway through the L2 period, we have an average of only 7% of individual ARs showing overlap with another AR. The conclusion that can be drawn is that our data were not heavily exposed to a clustering problem[16].

2.2 Results

The cumulative average abnormal returns of shares for each type of bond (convertible and exchangeable) are presented respectively in Figure 1 and in Figure 2.

Insert Figure 1

[16] The assumption that the distribution of abnormal returns has the same characteristics before and after the event is also important. Without any theoretical explanation, we do not see why an issue of convertible bonds could induce a larger or a smaller variance. A priori, there are as many reasons for the variance to increase as there are for it to decrease. If a CB issue strengthens the financial structure of the firm, the risk to the economic cash flow can be lower. If the CB issue helps to launch new risky investments through debt financing, the future variance may increase. The event does not yield in itself a 'one way' induced increase in the variance. On a large sample of stocks, the two phenomena may cancel each other out to some degree. However, the limited size of our EB sample exposes these data to a risk of induced variance.

The cumulative average abnormal returns are clearly negative. The stocks related to EBs show a 17.1% underperformance over the six-month post-event period. The CBs show a similar profile and result in a 9.7% abnormal negative return[17]. Before the issue date, there is only a limited drop of -1.5% to -2.3% between *d*-6 and *d*-3[18]. Looking at the parametric t statistics, this abnormal drop is not significantly negative for this very short window. This is explained by the large dispersion of individual CARs; more than one-third of them show evidence of positive abnormal returns around the issue date. However, the sign test shows a significant negative market reaction between *d*-6 and *d*-4 (i.e. before the CB issue, see Annex 2). This can probably be explained by the fact that the information about the issue is known in the market before the public announcement. Financial analysts know that the firm plans an issue and financial officers disseminate the information. The banks responsible for launching the issue contact partners to set up a syndicate. The delay in the issue and handling of the operation allows for information to circulate and for the market to adapt. The negative effects, possibly linked with dilution or overvaluation signals, are taken into account as soon as the market becomes aware of this information.

The date of the official announcement comes only at the end of this process. The initial drop in return is of short duration (since the abnormal returns become positive for EBs) and increases from a relative minimum of -2.3% at [*d*-6] to -1% for CBs in the 10 days following the issue. Examining the short-term window, we find no evidence of abnormal returns for EBs, rejecting the overvaluation hypothesis because, by definition, dilution cannot be observed with these issues. As a whole, dilution or overvaluation reaction following (or identified before) the

[17] We also calculated the abnormal returns according to normal returns based on a weekly estimated market model. This one was estimated five times, starting on different days of the week (i.e., Monday, Tuesday, etc.). We obtained five estimates of weekly betas for each stock. The weekly-based CARs were then calculated for all stocks. At day *d*+122, the five 'weekly' CARs were, respectively, -9.7%, -8.8%, -22.3%, -3.4% and -9.9%, giving an average value of -10.8%. These data are very similar to the CAR of -9.7%, resulting from a daily estimate of the betas in the market model. The daily estimates of betas will be favoured hereafter because of the higher number of observations (145 versus 29 for weekly betas).

[18] This remark does not reflect precisely the results of most of the empirical studies mentioned. These identify a significant drop immediately at or after the issue and not before.

announcement of an issue is rejected. Comparing abnormal returns of CBs to those of EBs outlines the importance of the dilution effect as being immediately perceived by the market. Abnormal returns are close to zero at the issue date of EBs, but are fairly negative for CBs, with an average value of -1.8%. The major difference between the two samples is due to a dilution effect, which is perceived negatively by the market. Therefore, the signaling overvaluation hypothesis is not confirmed by the analysis of the short-term reaction of the market. The -1% abnormal return seen in the 10 days after the issue is in line with previous studies considering French market data. Looking ahead, both EBs and CBs become increasingly negative within the first 20 days (or one calendar month) following the issue and stand then at around a -1.6% CAR.

2.2.1. Analysis of exchangeable bonds (EBs)

The overall drop in EB returns is important, which means that this type of operation, even though not exposed to dilution, will probably result in reduced value to investors. Most of this can be explained by the fact that contractual conversion ratios are fixed at a high level by the controlling shareholders who can then sell their shares at a good price. The average EB conversion premium at issue is 26.1%[19]. The diffusion of capital resulting from the potential placement of a block of shares on the market does not appear important enough for the dominant shareholder to lose control. The average diffusion rate of capital linked to 16 EB issues was found to be only 5% of the equity capital. We can hypothesize that EBs issues develop in a logic of adjustment of ownership by the majority shareholder, who cashes in part of his ownership by selling it at a price considerably higher than the market price. The abnormal six-month return closely equals the conversion premium at issue.

[19] Two EBs that had a negative bonus at issue were excluded from the calculation of this average.

However, we note that the cumulative average abnormal return remains non-significant prior to reaching the 68-day mark after the issue, when it reaches an average of -9%. This can be explained by the existence of large variations in the evolution of abnormal returns. Of the 16 stocks, we notice two issues for which the abnormal returns are positive (Rallye exchangeable with Casino and Agache with LVMH). These two issues do not prevent the average of abnormal returns from becoming significantly negative after three months. Concurrently, the sign test shows a significant cumulative negative return (at the 5% level) from the 37th day after the EB issue and from the 45th day (at the 99% level). The values of the cumulative average abnormal returns and the CAR test are presented in Annex 1. The values of the sign test over the L2 period are shown in Annex 2.

2.2.2 Analysis of convertible bonds

The raw results obtained above must be placed in context; the cumulative average negative abnormal returns of 9.7% over the six-month period are only superficially impressive (see Annex 1). They become statistically significant at the 10% level only after the 110th day after issue (at 5% after 118 days, and never at the 1% level). The sign test remains non-significant (see Annex 2). The calculation used to determine the excess returns has a weakness since it is based on beta coefficients for the normal stock returns calculated before the issue for firms with a given financial structure. The CB issue results in a reduction in the firm's debt leverage if and when the conversion takes place. Therefore, both the beta coefficient and the expected normal return would drop following the CB issue. The cumulative average abnormal returns shown in Figure 1 are therefore systematically biased in favour of accepting the hypothesis of an abnormal return. This problem does not exist for EBs; the firm's debt structure remains unchanged after the issue.

If we consider a CB issue as pure debt, no conversion, and conversely no dilution, should be taken into account. This very short-term approach is too simplistic; we must analyse CBs as a medium/long-term choice of financing policy. In case of a very strong likelihood of conversion, a dilution effect is also anticipated by investors, who will be faced with a larger number of shares. All other things being equal, the dilution causes a loss in share value for the firms issuing CBs. This dilution must, for rational investors, result in a normal return now based on the number of new shares compared to the number outstanding. Investors would take into consideration the firm's investment prospects. A CB issue will change the debt structure of the firm, but it can be used to finance new investment. Thus the dilution effect is not linked solely to mechanical change in the debt leverage, but must be mixed with the profitability prospects of the firm.

Therefore, we introduce two corrections with the goal not of defining not a strict estimate of abnormal returns, but rather a band inside which the abnormal returns may lie. The abnormal returns following a CB issue are limited first by the polar behaviour of the firm, which may behave differently in terms of restructuring/investing the raised fund and secondly, by the effective impact of the dilution effect. The two corrections soften the global negative abnormal return documented by traditional event study methodology and introduce lower and upper bounds on CARs. From a methodological point of view, the correction of systematic risk measures does not seem very common in the literature, with the noticeable exception of Janjigian (1987) or Kleidt and Schiereck (2006)[20].

- *Correction for debt leverage*

The first correction takes into account the mechanical effect of a CB issue, which is to reinforce the financial structure by increasing the firm's net equity due to future conversion.

[20] These authors document a systematic (positive) change in systematic risk after the issue date. They refer explicitly to variation in debt-asset ratios and mention the impossibility of detecting these moves ex ante.

Here, at the issue date, we consider a CB issue as net equity. The accounting debt leverage ratio (calculated from the equity accounting value) moves, on average, from 1.57 to 1.08 after the issue under the double hypothesis of a total and immediate conversion (for 34 firms issuing a CB). The debt leverage ratio calculated from the market value of equity moves from 0.82 to 0.72 (under the same double hypothesis). The investors consider conversion from an ex ante point of view and calculate the correction based on the characteristics of the issue and of the firm at the issue date. Looking at the CB sample, 96.7% of the matured issues have been fully converted. Only one issue, representing 2.8% of the total amount, was repurchased. The 14 CB issues of our sample still alive in December 2006 exhibit an average conversion rate of only 12% (weighted by individual CB amount). Among them, 9 out of 14 still have an outstanding amount identical to the nominal issued amount, which means that no conversion occurred from the bondholders. Looking at the outstanding issues in December 2006, recent issues are still out of the money and not converted, but the majority of those close to maturity have low (or negative) premiums. These ex post figures confirm the fact that CBs, on average, can be considered as almost entirely converted at maturity. Assuming that an average proportion of 96.7% of any issue is converted at maturity, and considering an average time to maturity of 6 years at the issue (see Table 2), we can estimate an ex ante discounting equity conversion factor applied to all CB issues. The actual proportional conversion factor is an average of 72.3% of the initial amount at the issue date[21]. This weighted amount should be added to the net equity of the firm to obtain its ex ante proxy of the new leverage ratio. The ex ante conversion probability is the only information available to investors, but it is very difficult to estimate case-by-case before and during the subscription periods just after the CB issue announcements. Moreover, this ex ante probability assessed by a standard CB pricing model evolves over time with option parameters. Even if we could estimate the underlying process of the asset at the issue date, this process can change through the investments made by the firm

[21] This figure comes from an average conversion frequency of 97% and a discount factor of 0.746, assuming an interest rate of 5% over the average 6-year duration of maturity converted CBs.

and the use of funds raised by the CB. Using the ex ante individual probability of conversion may therefore be misleading. The use of ex post data for determining the leverage adjustment should be considered as a convenient hypothesis of perfectly rational investors' expectations regarding conversion rates. The debt leverage ratio after the issue is obtained by adding the ex ante average discounted value of the CB to equity. This results in a correction in the value of the firm's beta by taking into account the consequences of its new debt structure. This correction results in a new value for the beta coefficient of the market model, which is lower due to the strengthening of the equity capital. The adjustment coefficient is therefore

$$\beta_{after} = \beta_{before} \times \frac{1 + l_{after}}{1 + l_{before}} \tag{7}$$

where l_{before} is the debt leverage before issue and l_{after} is the debt leverage after issue.

We focus here on the effect of the CB issue on the beta of the underlying stock and not on its effect on the debt beta. Other studies looking at CB portfolios consider particularities of CB betas that are (i) variable, and (ii) asymmetric due to optional characteristics. Frankle and Hawkins (1975) and Ammann, Kind and Seiz (2007) suggest the use of time-varying betas for CBs in order to correct these two features (see also Ang and Chen (2005), Ferson and Schadt (1996) and Adcock et al. (2007), for the use of time-varying betas in asset pricing and performance measurement of stock portfolios). Here, we do not assume that CB betas are constant. However, focusing on stock betas, we assume that these may be estimated regardless of the debt and CB betas of the firm. This assumption relies on checking that the corporate debt

beta of some of the firms in the sample is effectively negligible[22]. It is clear that our first order correction of equity beta provides only a mechanical adjustment. This is specifically due to the change in the leverage ratio considering CBs as deferred stocks and taking into account the effective conversion rate. This mechanical adjustment can be considered a suitable alternative in a comparative 'event studies' framework related to the existing literature that provides simple short-term impact analysis of a CB issue announcement. On average, the adjustment coefficient applied to beta values is 0.916 (using book debt leverage) and 0.964 (market based leverage). The market model is then used to give expected returns based on the new (book) debt leverage ratios. Lowering the beta risk premium, our correction results in a reduction in the expected normal returns, and thus leads to a lower negative abnormal profitability.

We obtain a cumulative negative profitability of 8.2% over the six months period following the CB issues. The gap between CBs and EBs widens (see Figure 2). The average cumulative return of CBs becomes significantly negative the 121st day after the issue (at the level of 10%; see Annex 1). This result is not robust because the return turns non-significant the next day. The non-parametric sign test, which aims to show cumulative negative abnormal returns, never satisfies the usual acceptance levels. This means that the average of returns hides a very strong dispersion of individual abnormal returns. At the end of the period, we found that 20 out of 34 shares had a negative cumulative return and 14 shares had a positive cumulative return. This means that after the debt leverage correction, one in three firms shows a significant positive cumulated abnormal return. On average, there is nothing to allow the

[22] In fact, the value of the beta coefficient after an issue should take into account the beta of the firm's debt. We then have: $\beta_a = \frac{D}{S+D}\beta_D + \frac{S}{S+D}\beta_e$, where β_a is beta of assets, β_D is beta of debt, β_e is beta of stocks, D is market value of debt and S is market value of equity. For a given economic beta of assets, the correction for the stock beta is equal to that of equation (7) only if the debt beta is zero. We validated this hypothesis by analysing for CB issues the parallel evolution of the returns of standard fixed income bonds of the same issuing firm within the same window as in L1. Only eight firms comprised this sample. The test of the market model applied to these eight bonds does not yield definitive results. In three cases the bond beta is significantly negative, in two cases it is significantly positive and in four cases, it is not significantly different from zero. The average value of the estimated bond betas is 0.032 and is statistically negligible. Under these conditions, we are led to the hypothesis of null bond betas, a hypothesis that was confirmed by a regression of the JP Morgan euro bonds index on the French stock index. The estimated value of the beta coefficient of the bond index was 0.0145 for the period 1995-2003. Thus, we consider the effect of bond betas to be negligible.

assertion of the existence of a negative cumulative abnormal return after a CB issue. Around the issue, the immediate negative market reaction that appears on day *d*-6 is non-significant and rapidly disappears. The drop in the required return linked to a lower beta diminishes the temporary drop of return only right when the issue is announced. Over the period [*d*-17, *d*+0] before the issue, the average cumulative return does not differ significantly from zero, with an average value of -0.8% as against -1.8% previously without correction (see Annex 1). It becomes null 7 days after the issue.

Depending on the CB issue, motivations of the issuing firm and stock market conditions, individual stock-like convertibles will obtain lower financial leverage and lower equity beta, while debt-like convertibles may increase financial leverage and increase equity beta. Our previous result is robust to the way the correction for subsequent leverage ratios of the firm is made. We considered the two extreme eventualities, as viewed from the issue date: (i) a total and immediate CB conversion, resulting in a drop in the leverage ratio; and (ii) a no conversion hypothesis, resulting in an increase in the leverage ratio due to the debt status of the CB. The correction factors of the beta are, on average, 0.896 (lower leverage due to conversion) and 1.179 (higher debt leverage). When correcting the individual values of the beta assuming these two eventualities, we get respective values of CAR of -4.4% and -8.4% at *d*+122. The CAR calculated using the average ex ante discounting factor (+8.2%) is between these two values. It should be pointed out that all three are lower than the initial CAR estimate without any leverage correction (-9.7%), and they all still remain non-significant. Annex 1 shows the two series of CARs resulting from the hypothesis of no conversion and from an immediate total conversion in stocks.

The necessity of taking into account an adjustment in the market model to obtain the normal return is rarely mentioned in the current literature, which generally focuses on a very short

period around the issue date. However, taking into account the mechanical effect of a change in leverage, as well as a longer investigative period, leads us to results that contrast with those usually presented in the literature, and revealing significant negative abnormal short-term returns after CB issues.

Our findings notably contradict the recent study by Ducassy (2003) for CBs on the French market. That study showed an abnormal negative return of 5% in the window [*d*-10, *d*+10] for issues announcing an investment goal. Ducassy concluded with the absence of abnormal return for CB issues designed for for 'financial restructuring'. Therefore, it seems that the financial communication from the issuing firm may explain the reaction to an announcement of a CB issue. According to Ducassy, the effect of the announcement is negative in the case of future investments. If the goal is to avoid loss of value for existing shareholders, the issuing firm tends to announce a goal of financial restructuring. Conversely, if the firm wishes to lower its market price for reasons unrelated to the existence of a dominant shareholder (for example, to buy shares on the market at a lower cost and to reinforce its own control), it will advertise its motivation as investment.

In the event of a clear communication by the issuing firm of its intentions, the results of Ducassy and other authors (including Burlacu (2000), Hachette (1991, 1994) and Bah (1997), for the French market reaction) could very well be reversed. After correcting for the simple effect of leverage for firms that declare an investment motive, temporary abnormal returns can become non-significant, like those we obtained for the window [*d*-8, *d*-6]. Similarly, if we consider the scenario in which firms use CBs to improve their financial structure and effectively do so, it is necessary to make a double correction of the beta, because the CB first raises the net equity and then serves to reduce debt. In this case (always supposing that the

announcement reflects the firm's real policy), it is possible in the end that null abnormal returns become positive abnormal returns.

Of course, it is very difficult to believe the published intentions of the issuing firm. Nevertheless, the study by Ducassy (2003) reveals that one-third of the studied firms (22 of 60) intended to carry out a financial restructuring. In their study of a sample of European firms, Bancel and Mittoo (2004) mention such an intention in 23% of cases. The two objectives of financial restructuring and of undertaking investments are not mutually exclusive. Both can be pursued jointly. Under these conditions, it would seem preferable, in our analysis of CB issues, not to take into consideration the objectives published by the issuing firm, as we are aware that the communication policy of these firms may pollute their announced intent. This prudence highlights the necessity of judging the effects of abnormal returns over a period longer than 10 or 20 days after the announcement of the issue. In effect, during the six months following the event date, the market can progressively observe the true behaviour of the issuing firms: a policy of financial restructuring or of developing investments. The effective ex post decisions are then integrated into the market values. The large variations in forecast behaviours or strategies can explain the non-significant results before or at the time of issue.

After correcting for the debt leverage effect, we observe that after four months (*d*+88), abnormal cumulative negative returns are -3%. The average cumulative negative return of -8% only appears at the end of the overall period (i.e. six months). The sign test confirms the non-significance of these abnormal cumulative returns up to *d*+122. In fact, the -8% figure makes it scarcely convincing that this average should cover many different situations of positive and negative individual CARs. From here forward, we take into account the debt correction of beta coefficients when estimating the normal returns.

- *Correction for the dilution effect*

Another correction could be made to 'neutralize' any possible dilution effect and to explore the abnormal returns in a more optimistic approach. In fact, a drop in the stock market price several days before the issue can result from investor sensitivity to the fear of dilution of the overall share value. Nothing leads us to confirm whether the dilution is certain. If, as in the announcement, we integrate a pure dilution effect into the market value of the shares, we make a completely pessimistic hypothesis of the use of raised funds, that is, that they will reimburse payable debts and have a null effect on the economic profitability of the firm. Given a CB issue that has the only consequence of no change in the firm's equity value and immediate diluting, the existing shareholders see their investment value drop by an average of 1.8% in the sample. In the event that investors' pessimism is justified, the market value following an issue fully integrates the dilution effect. Thus, we assume that at the issue date, the market value covers (among other things) a drop of 1.8% resulting from a pure dilution effect. An optimistic investor who considers the contrary hypothesis (i.e., that no dilution effect exists) may reconstruct the market value by cancelling the hypothetically integrated dilution effect. To reconstruct the market value without a supposed total dilution effect and use it as upper bound, it is necessary only to raise the market value by about 1.8% by multiplying it on the day of issue. We used this correction when considering a specific dilution correction coefficient for each individual issue. The dilution coefficient is calculated from the total number of outstanding, shares divided by the total number of new shares resulting from conversion of the amount issued and outstanding shares. We added the convertible issued amount to the equity at the issue date. Total equity inflates from the issued amount (including the conversion premium). In this pessimistic view the raised funds are immediately assimilated to equity capital and used to reimburse debts.

Figure 2 re-examines the abnormal profits now doubly corrected (accounting for debt leverage and 'pessimistic' dilution). The cumulative abnormal return is positive from *d*+0 to *d*+51 for the investors who estimate the dilution effect to be null. The abnormal positive return when dilution is absent is +0.7% on the day of the announcement, compared with a drop of -1.8% if no correction is made. It increases to reach +1% and shows an opposite positive sign compared to other abnormal return studies without correction. The CAR stays in the -1/-2% range until *d*+110 and then decreases to finish at a cumulative return over six months at an average -6.7%. At no time is the cumulative return significantly negative (see Annex 1). The non-parametric sign test also confirms this result. Table 3 summarizes the cumulative average abnormal returns at *d*+122 for different sizes of the L1 window and when referring to the constant mean model to estimate the normal returns. In every case, the results converge. They confirm that a market model used without correcting the beta could lead to significant and negative abnormal returns. However, taking into account modified levered betas for CBs shows non-significant CARs (except for the shorter estimation period and only 6 months after the issue date, see Table 3)[23]. The results are robust relative to the choice of the pre-event estimation period used to estimate the beta coefficients. Both longer and shorter windows give similar results in a double correction framework and confirm the importance of correcting beta in the abnormal return test (see Table 3).

INSERT Figure 2

INSERT Table 3

[23] The reference to an alternative constant mean return model also leads to similar results; the cumulative average abnormal return at *d*+122 moves from -14% to -10% and turns from a significant value at the 1% level to a weaker 10% level when correcting the betas for leverage.

It must be noted that a scenario of total dilution effect is based on the pessimistic assumption of an unchanged firm's current profit and increased net equity capital. In this extreme case, the dilution effect corresponds to a strategy of 'debt reimbursement and strengthening of the financial structure'. We can suppose that the collected funds replace existing debt and diminishes its net cost and, thus, that they have effect on the profit due to shareholders. It also corresponds to a similar situation where all the operating profit linked to any new investment financed by the CB is just sufficient to cover the cost of the CB. In this situation, the issue of a CB is an unfavourable signal and should result in significantly negative cumulative average abnormal returns. Our results do not confirm this hypothesis of an overall negative long-term effect.

A strategy of 'profitable investment opportunities' can also be mentioned when the reinvested funds produce perspectives of improved results and thereby support a rise in the share value. If the investments show profitability greater than the cost of the CB, their dilution effect on the firm's profit and on market value varies according to the creation of value for all shareholders. It may even be cancelled. Similarly, looking at a strategy of 'reinforcing the financial structure', the operation, even with its mechanically dilutive effect, can create value for the shareholder because it reduces the cost of capital and/or places the firm at its optimum level of debt, if it is not already in that position. In such a case, the incidence in terms of net dilution effect may be null or reversed. A combination of these two financial strategies may also be possible.

It is better to assume an uncertain future dilution effect between the two extreme cases of (i) a 100% dilution effect without any value creation, and (ii) a null (positive) net dilution effect. This is due to the creation of balancing (greater) economic value compensating dilution. Under the latter optimistic hypothesis, the creation of value would be positive, thus

compensating for the dilution effect. Therefore, the average market reaction would cover a wide variety of situations specific to each firm's strategy (see the grey area in Figure 2). In a possible mixed scenario, the market equity value of the firm inflates by the amount of the CB issue, assuming a reinvestment of the proceeds at the firm's cost of capital and no debt reimbursement. Then, a positive effect will limit dilution. In our sample, the average amount of equity market value will increase by 9.20% if conversion is immediate. It compares with a total immediate and apparent dilution effect of -9.97%. Any mixed scenario stands between the polar limits of pure dilution correction and no dilution correction seen in Figure 2. In summary, it is unsurprising that, in such a context, the sign of cumulative average abnormal returns becomes non-significant.

2.2.3 Analysis of CAR explaining variables

It is of interest to determine which variables explain the size of cumulative negative returns in EB and CB samples over the L2 period [d-17, d+122]. We performed a cross-sectional regression to test if firms' characteristics explain the direction or the magnitude of the abnormal market returns. The CAR of each EB was regressed against the rate of diffusion of capital involved by the EB issue, the conversion premium at the time of issue (in %), the amount of the issue, the accounting debt leverage and the maturity of the EB at its issue. We added two other variables to take into account the firm's investment policy. The first one is the market-to-book ratio, which represents the ratio of the market value to the book value of equity. It corresponds to the existence of potential profitable investment projects. We also considered the variation of the beta coefficient, which compares the beta values of the market as estimated before and after the issue, with the beta after the issue calculated during the second six-month window, L2. In the latter case, to avoid a possible endogeneity problem, we do not use the series of CARs as a dependent variable. The initial β_0 coefficient appears in both sides of the regression equation. As a dependent variable we used the CARs calculated

as the simple excess stock return minus the market index return (i.e., assuming beta is equal to 1). Therefore the dependent variable is free from any beta estimates. Individual OLS regressions were used because of possible collinearity between some variables; for example, diffusion ratios and issued amounts are correlated (the same is true for dilution ratios). Table 4 shows the results obtained for the EBs. No variable appears to explain the individual abnormal negative returns.

INSERT Table 4

The same simple linear regressions were carried out for the CB sample. We chose the dilution ratio of initial equity due to the CB issue as first explanatory variable (cf. Table 5). The other independent variables were the same as those used to analyse the CARs of EBs. None of the variables corresponding to the characteristics of the issue or of the firm had any significant effect on the size of the abnormal returns. Only the beta variation was shown to play an explanatory role (significant with a p-probability of 0.073) in the individual abnormal negative returns. An increase in the beta between the periods before and after the issue corresponds to an abnormal negative return. All things being equal, after the issue, an increase of 10% in the beta caused an abnormal negative return of 2.6% for the stock. That confirms the intuition that a higher forecasted risk elicits a relative drop in the stock value.

INSERT Table 5

The previous result illustrates that the ultimate determining factors of excessive or insufficient performance must be analysed in the context of the financial policy linked to the CB issue: profitable investment perspectives or a strategy of financial restructuring. We are led to a case-by-case analysis in a situation of information asymmetry because investors in the market

do not have access to private economic information, nor do they know the true intentions of the issuer. Investors in the market know only the current beta at the moment of issue. The future behaviour of the firm is directed by decisions that cause a decline in beta (decrease in debt leverage, financial restructuring, investment of received amounts in projects with low economic risk), or conversely an increase in beta (high risk investments, increase in debt following a CB issue).

These decisions can be cumulative. In a market characterized by a high degree of information efficiency, investors will, during the six months following a CB issue, appreciate or sanction the firm's new decisions. A significant variation in the beta would prove this. Consequently, it is useful to see if significant differences in beta exist between the two six-month sub-periods. Under the null hypothesis of beta stability, the betas must on average remain constant. The average estimated beta drops from 0.89 to 0.80 in the six months following a CB issue for the 43 firms in the sample. In 33 of the 43 cases, they do not differ significantly during the period. In four cases, they are significantly higher and, in six cases, significantly lower. Thus, a small number of firms proceed toward strategic changes that lead to an increased risk for them. Others lower their risk, for example, by reducing their debt. Thus, we observe a strategic ex post financial dimension that was not apparent at the initial announcement date. This fact largely explains the cumulative negative returns, which can thus be redefined as normal and no longer abnormal. A firm need only reduce its debt and its risk after the issue for the former beta to lead to expected returns that are too high and to incorrectly produce negative excess returns. This explanation is consistent with the significant relationship between abnormal returns and beta variations, as previously highlighted. On average, the change in beta corresponds to the application of the average adjustment coefficient linked to the decline in debt leverage previously estimated at 0.91 (and based on the assimilation of the CB issues into new equity). By applying this to the average beta before issue, we find an

average provisional beta of 0.81 (0.89 multiplied by 0.91). The average provisional beta is effectively the one observed six months after the CB issue in the market (0.80)[24].

It is therefore a rational conclusion for investors to expect, on average, a new corrected beta value equal to the initial beta, but modified by the variation of the leverage effect. Thus, investors are generally justified in nullifying the voluntary choices of investment policy and debt strategies, which can result in either an increase or a decrease in the beta. On average, the two possibilities seem equal. The choices are thus made according to the real surplus returns, which are abnormal if we apply the former betas, but which are fully justified by the firm's ultimate decisions. These positive and negative surplus returns, linked to beta correction, make the abnormal returns estimated from previous data null, if analyse any CB issue ex ante.

2.2.4. Consequences for portfolio management

In the case of a CB issue, the previous developments can explain the better performance of a CB investment as opposed than that of underlying stocks. At the time of issue, the higher cost of convertibles is due to a stock price increased by conversion premiums. However, underlying stocks are generally affected during the CB life by a return that is mechanically lowered to its new equilibrium, which integrates an average financial restructuring behaviour. In addition, compared to stocks, CBs have the advantage of an interest coupon.

INSERT Table 6

Table 6 shows the average annual returns of the Exane 25 index of the most significant European CBs with a clear hybrid character (delta around 50%) over a 12-year period. It also

[24] A case-by-case study of the economic and financial choices of the firm following the CB issue could have been carried out in order to explore which type of investments (diversification, risky projects, etc.) and which liability restructuring decisions (increase or decrease in leverage) have effectively been made. The case-by-case analysis may be more relevant than relying on estimated betas, particularly if it were possible to conduct an analysis over a period longer than six months. Often more than six months is needed after the issues to detect the effective intentions and strategic choices of the firms.

shows the Sharpe ratio for this type of hybrid CB[25], which has an average of 0.065. The return of the basket of underlying shares is concurrently calculated. To be strictly comparable to CB performance, we must add the stock dividends in order to be consistent with CBs which pay interest coupons. The average Sharpe ratio for the basket of underlying stocks then becomes 0.018. The comparison of performance by the Exane index between the underlying CB stocks and the CAC 40 market index yields similar results. The findings are normal because the most significant CB issues are carried out by large firms, which belong to the CAC 40 index[26]. In the light of our results, the superiority of CBs as a class of assets in comparison to stocks can be explained by the inconvenience of holding the stocks of firms that, having issued a CB, are exposed to an additional hazard related to the use of the received funds. In fact, during a CB issue, the investors in underlying shares are in a situation of information asymmetry with regard to the issuing firm's financial communication policies and future strategies. This risk leads average investors to protect themselves by discounting a mechanical decline in the debt leverage. However, this rational ex ante attitude is subject to the uncertainty of the issuing firm's financial or economic strategies. The global over-performance of a CB portfolio can find part of its explanation in these specific risks as compared to a simple stock issue, where the choice is clear in terms of financial structure.

Conclusion

In recent years, the reaction of the prices of underlying stocks in a CB issue on major international stock markets has been regularly tested. The majority of empirical work, except for studies carried out in Japan and the Netherlands, indicates a negative market reaction, mostly measuring abnormal returns within a very short window around the announcement

[25] The CBs have an asymmetric return because of the presence of a purchase option, which makes it rather difficult to use the Sharpe ratio. However, in this case the Exane index is based on convertible bonds, which are renewed, and remains on average 'at the money'. Thus the Sharpe ratio here constitutes an acceptable approximation.

[26] It seems there is no long period 'sector' effect of CB issues compared to the rest of the market since the average daily return and standard deviation are very close in the two indexes.

date of a CB issue in. In the light of these results, our contribution is to investigate the consequences of issuing convertible or exchangeable bonds on the French stock market. More precisely, our aim is to review the market reaction to the issue by employing different corrections and by selecting a window of analysis over a longer term of seven months before and six months after the issue date. We introduced two corrections on the debt leverage ratio and on the importance of the dilution effect. We defined not a strict estimate of abnormal returns, but a band inside which the abnormal returns may lie. The corrections will soften the global negative abnormal returns documented by a simple traditional event study methodology and introduce higher bounds on CARs. This correction in the variation of the debt leverage ratio following a CB issue appeared significant and robust to the results empirically obtained on French CBs. Such an effect can explain the negative signs often observed in previous studies, a point that has not often been raised in the existing literature, except, in a different context, by Janjigian (1987) or Kleidt and Schiereck (2006). Our study shows cumulative abnormal returns that are, on average, negative for EBs and non-significant following CB issues. This absence of global incidence is indicative of considerable differences in individual behaviour by issuers of CBs. We need to take into account their effective intentions and strategic choices when analysing CB issues. The two goals, described as ‘investment financing’ or ‘financial restructuring’, are not mutually exclusive; both may both exist when issuing. They may both be used by the issuers as elements of their financial communication. However, if they exist, the two goals only gradually become perceptible as the firm evolves.

These motivations are not revealed in the short windows of observation that highlight abnormal returns resulting from a CB or EB issue. The analysis of the dilution effect and that of the different explanatory variables of cumulative average abnormal returns does not enable us to identify a clear common determining factor for the firms in the sample. However, there

is value in studying the post-issue financial behaviours of the firms as identified through the variation in betas calculated before and after the issue. This method, rarely used in the available literature, also enables us to confirm the large divergence of effective behaviours, which is perfectly consistent with abnormal returns that are generally non-significant.

Our empirical results were then put into perspective within the context of portfolio management by analysing CB performance as a class of assets compared to other classes of related assets, such as stocks and bonds. The EB issuing firms appear to benefit from a transfer of value because their participation is sold at a price clearly above the market value. The gain in value should then benefit the shareholders of the issuing firm. The positive effects counterbalancing dilution and resulting from the investment/financing decisions inherent in a CB issue take place in a context of asymmetric information for the outside shareholders. We show that the investor should not harbour an a priori fear of the dilution effect during a CB issue. A CB issue, on its own, creates future value for the shareholders if it enables the firm to make other profitable investments. It can also constitute a positive signal regarding the restructuring of the firm's financial liabilities and the optimisation of its debt structure. Outside shareholders facing a CB issue cannot say with any degree of certainty whether a future dilution will occur. The size of the dilution is determined by an unknown investment/financing policy of the firm; a CB issue is just one element. The unanticipated changes in risk class following a CB issue appear to correspond effectively with ex post abnormal returns. In the light of the work of Carayannopoulos (1996) and Ammann et al. (2003), one intuitive explanation for our results regarding a possible underpricing of CBs might be that standard CB pricing models might not pay enough attention to the additional specific risk outlined in our analysis. In fact, we can hypothesise that CB issues bear a specific risk compared to standard debt or equity issues. In these two situations, the leverage ratios are immediately affected and

outside investors are (classically) exposed to asymmetric information regarding the use of the raised funds. For CBs, the changes in leverage ratios are uncertain and depend on the conversion's completion and speed. CBs involve a specific risk related to the future financial leverage of the firm, which cumulates with the dilution risk. Ceteris paribus, this makes CB issues more risky and might explain the apparent overperformance, and the possible underpricing, of this class of asset compared to stocks.

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Table 1

Empirical studies on convertible bond issue announcements

Country	Author(s)	Market reaction to announcement
US	Dann and Mikkelson (1984)	-2.31%
	Eckbo (1986)	-1.90%
	Smith (1986)	-2.07%
	Hansen and Crutchley (1990)	-1.45%
	Kim and Stulz (1992)	-1.66% and -1.07%
	Lee and Loughran (1998)	-1.30%
Japan	Kang, Kim, Park and Stulz (1995)	0.50%
	Kang and Stulz (1996)	0.83%
	Christensen, Faria, Kwok and Bremer (1996)	0.18%
	Mollemans (2002)	-4.50%
Germany	Ammann, Fehr and Seiz (2006)	-1.56%
Switzerland	Ammann, Fehr and Seiz (2006)	-0.89%
Netherlands	De Roon and Veld (1998)[27]	0.23%
UK	Abhyankar and Dunning (1999)	-1.21%
France[28]	Bah (1997)	-0.44%
	Hachette (1991, 1994)	-0.56%
	Burlacu (2000)	-0.23%
	Ducassy (2003)	-0.88%

[27] The authors also summarize the available literature on the effects of a CB announcement and the incidence of the 'conversion to shares' component in the observed reactions.

[28] For a synthesis of empirical studies of the French market reaction to a CB issue, see Hachette (1991), Hamon and Jacquillat (1992), Ginglinger (2000) and Gajewski and Ginglinger (2002). Ginglinger (2000) proposes, in addition, a synthesis of studies related to the long-term performance of CB issuers, and emphasises the difficulty of interpreting the results, which are generally unfavourable. According to Eckbo, Masulis and Norli (2000), one of the explanatory factors would be the 'timing' of the issue, which is often launched after a sharp rise in the share price.

Table 2

Characteristics of the sample

M: million; Maturity: at the issue date in years, Long-term debt: estimated long- and medium-term book value debt; Book leverage: debt leverage ratio using the accounting value of equity; Market leverage: debt leverage ratio using the market value of equity; New shares: number of potentially created shares; Outsd. shares: number of existing shares; Diffusion: percentage of equity capital of the target firm converted in EB issues, Dilution: ratio of the number of new shares following the CB conversion divided by the total number of new and outstanding shares, Corr. book beta: beta coefficient corrected on the basis of the book value leverage; Corr. market beta: beta coefficient corrected by the market value leverage.

	Average	Minimum	Maximum	Standard deviation	N
Maturity	6.07	2.50	16.88	2.96	59
Coupon (%)	2.20	0.00	7.92	1.42	59
Amount (M€)	738.98	121.51	3492.00	630.14	59
Long-term debt	6748.66	5.38	35767.00	7551.26	35
Book leverage	1.57	0.02	15.67	2.61	34
Market leverage	0.82	0.01	6.42	1.28	24
New equity book value (M€)	7504.52	204.14	38685.00	7383.86	49
New equity mkt. value(M€)	11355.43	978.05	57832.38	13002.39	39
New book leverage	1.08	0.01	6.34	1.12	34
New market leverage	0.72	0.01	5.20	1.04	24
Var. book leverage	-0.49	-9.33	-0.01	1.59	34
Var. market leverage	-0.10	-1.22	0.00	0.24	24
New shares (M)	16.24	1.44	120.79	19.94	59
Outsd. shares (M)	359.04	5.20	1452.66	442.53	56
Diffusion ratio (EBs)	0.05	0.00	0.09	0.03	16
Dilution ratio (CBs)	0.91	0.54	0.99	0.08	40
Conv. premium (%)	25.00	-20.50	102.25	18.52	59
Corr. book beta	0.90	0.44	0.99	0.12	34
Corr. market beta	0.96	0.84	1.00	0.03	24

Table 3

CARs tests according to different lengths of estimation period L1

CAR at *d*+122: cumulative abnormal return 122 business days after the issue, in decimal; leverage correction: average correction for debt leverage; dilution corrections: abnormal returns doubly corrected with new debt leverage and a supposed total immediate dilution; *: 10% confidence level, **: 5% confidence level, ***: 1% confidence level; First significant day: first day of the event period L2 evidencing a non-zero cumulative average abnormal return at 95% level; for the four samples, N is respectively 15, 42, 34 and 34.

	EB sample	CB sample (without correction)	CB sample (with leverage correction)	CB sample (with dilution corrections)
Market model				
L1 [*d*-90,*d*-18]				
CAR at *d*+122	-0.177	-0.125	-0.139	-0.124
t-test	-2.65***	-2.60***	-2.78***	-2.49**
First significant day	*d*+87	*d*+97	*d*+111	*d*+112
L1 [*d*-163,*d*-18]				
CAR at *d*+122	-0.171	-0.097	-0.082	-0.067
t-test	-2.87***	-1.99**	-1.56	-1.28
First significant day	*d*+68	*d*+119	none	none
L1 [*d*-236,*d*-18]				
CAR at *d*+122	-0.134	-0.105	-0.079	-0.066
t-test	-2.02**	-2.18**	-1.52	-1.27
First significant day	*d*+122	*d*+116	none	none

Table 4

Analysis of determinants of the CARs of EBs

Diffusion ratio: fraction of capital of the target firm to be exchangeable; Premium: conversion premium at issue in percentage; Amount issued: size of the issue in millions of euros; Book leverage: book value of the debt to equity ratio; Maturity: at the issue date in years; MtB: Market to book ratio; β_0-β_1: variation of the market model estimation of beta before and after the issue with betas estimated on the L1 and the L2 windows, respectively; dependent variable is CARs estimated using a market model with a single debt leverage correction except for β_0-β_1, where the dependent variable is the CAR estimated using a simple mean market model; b: estimated regression coefficient; a: estimated constant, standard deviation is shown in parentheses; F: F-Fisher; number of observations is 16.

Independent variable	b	a	F	p-val
Diffusion ratio	-0.674	-0.141	0.078	0.926
	(2.417)	(0.124)		
Premium (%)	-0.004	-0.080	1.589	0.239
	(0.003)	(0.092)		
Amount issued	-0.514	-0.070	0.505	0.615
	(0.723)	(0.113)		
Book leverage ratio	-0.001	-0.138	0.003	0.997
	(0.012)	(0.073)		
Maturity	0.041	-0.383	1.125	0.352
	(0.039)	(0.207)		
MtB	-0.034	-0.014	0.450	0.655
	(0.051)	(0.175)		
β_0-β_1	(-0.028)	(0.057)	0.024	0.977
with CAR mean	0.184	0.056		

Table 5

Analysis of determinants of the CARs of CBs

For definitions of the variables: see Table 4; dilution ratio: fraction of capital of the target firm to be converted compared to outstanding equity; number of observations is 34.

Independent variable	B	a	F	p-val
Dilution ratio	0.173	-0.241	0.062	0.941
	(0.693)	(0.638)		
Premium (%)	-0.004	0.017	2.185	0.130
	(0.003)	(0.085)		
Amount issued	0.046	-0.100	0.297	0.744
	(0.084)	(0.062)		
Book leverage ratio	-0.026	-0.041	1.648	0.208
	(0.020)	(0.061)		
Maturity	-0.004	-0.054	0.084	0.919
	(0.015)	(0.112)		
MtB	0.008	-0.092	0.875	0.431
	(0.009)	(0.076)		
β_0-β_1	-0.265	-0.026	2.843	0.073
with CAR mean	(0.157)	(0.041)		

Table 6

Average return, standard deviation and return-risk ratio of convertible bonds, underlying shares and CAC 40 index

Av. Return: average return in decimal, Std. dev: annual standard deviation, Ratio: average return divided by standard deviation using daily data; period: 1991-2003; source: Exane.

	Exane convertibles index			Underlying stocks index (incl. dividends)			Underlying stocks index (excl. dividends)			French CAC 40 index		
	Av. return	Std. dev	Ratio	Av. return	Std. dev	Ratio	Av. return	Std. dev	Ratio	Av. return	Std. dev	Ratio
1991-2003 average	0.00038	0.00576	0.06557	0.00025	0.01380	0.01804	0.00021	0.01318	0.01594	0.00026	0.01406	0.01836
2003	0.00036	0.00158	0.22451	0.00081	0.01580	0.05101	0.00076	0.01578	0.04790	0.00059	0.01609	0.03644
2002	-0.00001	0.00449	-0.00268	-0.00169	0.02034	-0.08320	-0.00173	0.02034	-0.08511	-0.00161	0.02238	-0.07199
2001	-0.00035	0.00586	-0.05923	-0.00121	0.01614	-0.07470	-0.00124	0.01839	-0.06739	-0.00106	0.01675	-0.06299
2000	-0.00011	0.01148	-0.00989	-0.00036	0.01610	-0.02216	-0.00038	0.01498	-0.02535	0.00006	0.01465	0.00385
1999	0.00061	0.00635	0.09555	0.00129	0.01114	0.11558	0.00126	0.01091	0.11547	0.00160	0.01207	0.13233
1998	0.00117	0.00911	0.12801	0.00165	0.01513	0.10883	0.00158	0.01367	0.11560	0.00108	0.01660	0.06517
1997	0.00061	0.00520	0.11647	0.00147	0.01218	0.12061	0.00143	0.01194	0.11974	0.00100	0.01396	0.07148
1996	0.00056	0.00252	0.22171	0.00045	0.01552	0.02871	0.00040	0.00690	0.05859	0.00084	0.00788	0.10670
1995	0.00057	0.00323	0.17639	0.00027	0.00983	0.02753	0.00024	0.00983	0.02442	0.00000	0.01104	-0.00041
1994	-0.00039	0.00453	-0.08519	-0.00102	0.01145	-0.08915	-0.00095	0.01074	-0.08876	-0.00077	0.01106	-0.06948
1993	0.00103	0.00367	0.28192	0.00103	0.00882	0.11681	0.00090	0.00898	0.09988	0.00082	0.00977	0.08356
1992	0.00041	0.00424	0.09634	0.00005	0.01056	0.00437	0.00000	0.01067	0.00039	0.00026	0.01209	0.02149
1991	0.00045	0.00485	0.09230	0.00045	0.01140	0.03986	0.00041	0.01136	0.03591	0.00050	0.01234	0.04069

Annex 1

Cumulative average abnormal returns for EBs and CBs samples

CARs: Cumulative average abnormal returns from *d*-17 to the final day; *d* is the issue date; results are presented with a 5-day step; Market model estimation window L1 *d*-163, *d*-18; Number of underlying shares in the sample: 16 EB issues, 42 CB issues in the without correction case, 34 for CB issues in the other cases; leverage correction: average correction for debt leverage; no conversion hyp: hypothesis of no conversion, debt leverage is calculated assuming CB remains debt; total conversion hyp: hypothesis of total immediate conversion; dilution correction: abnormal returns corrected with new debt leverage and a supposed total dilution at maturity date; t-test CAR: relation (5) statistic from *d*-17 to the final day; *, **, and ***: significant at the 10%, 5% and 1% level, respectively.

	EBs		CBs (without correction)		CBs (leverage correction)		CBs (no conversion hyp)		CBs (total conversion hyp)		CBs (dilution correction)	
Day	CAR	t-test	CAR	t-test	CAR	t-test	CAR	t-test	CAR	t-test	CAR	t-test
-15	-0.0109	-1.2467	0.0079	1.1191	0.0074	0.9657	0.0068	0.8895	0.0075	0.9712	0.0074	0.9657
-10	-0.0003	-0.0206	0.0126	1.0927	0.0176	1.3994	0.0143	1.1376	0.0178	1.4143	0.0176	1.3994
-5	-0.0187	-1.0265	-0.0171	-1.1689	-0.0091	-0.5715	-0.0105	-0.6587	-0.0090	-0.5623	-0.0091	-0.5715
0	-0.0111	-0.5201	-0.0180	-1.0454	-0.0079	-0.4214	-0.0061	-0.3228	-0.0080	-0.4227	0.0070	0.3733
5	-0.0082	-0.3374	-0.0083	-0.4242	-0.0009	-0.0436	0.0000	-0.0018	-0.0009	-0.0417	0.0140	0.6594
10	0.0111	0.4169	-0.0145	-0.6727	-0.0038	-0.1637	-0.0033	-0.1420	-0.0038	-0.1622	0.0111	0.4734
15	0.0026	0.0912	-0.0128	-0.5503	0.0028	0.1087	0.0024	0.0928	0.0028	0.1092	0.0177	0.6956
20	-0.0159	-0.5123	-0.0184	-0.7346	-0.0012	-0.0449	-0.0001	-0.0051	-0.0012	-0.0444	0.0137	0.5020
25	-0.0341	-1.0316	-0.0178	-0.6663	-0.0010	-0.0360	0.0006	0.0215	-0.0012	-0.0409	0.0139	0.4781
30	-0.0332	-0.9504	-0.0205	-0.7287	-0.0022	-0.0719	-0.0026	-0.0842	-0.0024	-0.0785	0.0127	0.4147
35	-0.0400	-1.0878	-0.0207	-0.6990	-0.0006	-0.0183	0.0004	0.0126	-0.0007	-0.0231	0.0144	0.4447
40	-0.0583	-1.5170	-0.0142	-0.4586	0.0063	0.1872	0.0121	0.3575	0.0060	0.1780	0.0213	0.6928
45	-0.0715	-1.7862*	-0.0159	-0.4940	0.0011	0.0308	0.0099	0.2823	0.0006	0.0174	0.0160	0.4555
50	-0.0612	-1.4722	-0.0240	-0.7160	-0.0078	-0.2127	-0.0002	-0.0046	-0.0082	-0.2230	0.0072	0.1961
55	-0.0635	-1.4723	-0.0315	-0.9075	-0.0224	-0.5900	-0.0043	-0.1144	-0.0231	-0.6096	-0.0074	-0.1954
60	-0.0810	-1.8175*	-0.0359	-1.0001	-0.0287	-0.7329	-0.0106	-0.2693	-0.0295	-0.7514	-0.0137	-0.3512
65	-0.0831	-1.8086*	-0.0251	-0.6793	-0.0182	-0.4506	-0.0064	-0.1577	-0.0188	-0.4641	-0.0032	-0.0805
70	-0.0952	-2.0126**	-0.0361	-0.9481	-0.0272	-0.6533	-0.0156	-0.3744	-0.0278	-0.6669	-0.0122	-0.2939
75	-0.0983	-2.0209**	-0.0452	-1.1530	-0.0336	-0.7845	-0.0214	-0.4988	-0.0342	-0.7993	-0.0186	-0.4346
80	-0.1085	-2.1735**	-0.0554	-1.3784	-0.0273	-0.6201	-0.0167	-0.3810	-0.0277	-0.6313	-0.0123	-0.2795
85	-0.1136	-2.2198**	-0.0688	-1.6674	-0.0416	-0.9235	-0.0225	-0.4994	-0.0424	-0.9413	-0.0266	-0.5913
90	-0.1346	-2.5668**	-0.0577	-1.3664	-0.0316	-0.6847	-0.0119	-0.2579	-0.0325	-0.7055	-0.0166	-0.3603
95	-0.1368	-2.5507**	-0.0642	-1.4868	-0.0316	-0.6688	-0.0070	-0.1482	-0.0327	-0.6919	-0.0166	-0.3517
100	-0.1484	-2.7086***	-0.0661	-1.4983	-0.0362	-0.7505	-0.0102	-0.2123	-0.0374	-0.7756	-0.0212	-0.4401
105	-0.1379	-2.4647**	-0.0708	-1.5709	-0.0394	-0.8000	-0.0110	-0.2231	-0.0405	-0.8231	-0.0244	-0;4960
110	-0.1546	-2.7083***	-0.0680	-1.4792	-0.0381	-0.7583	-0.0062	-0.1228	-0.0395	-0.7866	-0.0231	-0.4602
115	-0.1663	-2.8579***	-0.0849	-1.8125*	-0.0658	-1.2851	-0.0283	-0.5537	-0.0674	-1.3161	-0.0508	-0.9927
120	-0.1767	-2.9824***	-0.0996	-2.0559**	-0.0830	-1.5918	-0.0484	-0.9288	-0.0844	-1.6191	-0.0680	-1.3048
122	-0.1714	-2.8718***	-0.0971	-1.9884**	-0.0820	-1.5613	-0.0442	-0.8413	-0.0836	-1.5920	-0.0672	-1.2710

Annex 2

Sign test on cumulative average abnormal returns

Sign test statistic from *d*-17 to the final day; *d* is the issue date; results are presented with a 5-day step; leverage correction: average correction for debt leverage; dilution corrections: abnormal returns corrected with new debt leverage and a supposed total dilution at maturity date; Sign test statistic calculated from equation (6) follows a normal distribution; *, **, and ***: significant at the 10%, 5%, and 1% level, respectively.

Day	EB sample	CBs (without correction)	CBs (leverage correction)	CBs (dilution corrections)
-15	-1.500	1.677**	1.715**	1.715**
-10	0.500	1.067	1.029	1.029
-5	-1.000	-1.982***	-1.715**	-1.715**
0	-1.000	-1.677**	-0.686	0.686
5	-0.500	-1.372	-1.029	-0.343
10	0.500	-1.677**	-0.686	0
15	0.000	-1.677**	-0.343	0
20	-0.500	-0.762	-0.343	0.343
25	-1.000	-1.372	-1.029	0.343
30	-1.000	-0.457	-0.343	0.343
35	-1.000	-0.762	-0.343	0
40	-1.500	-1.372	-1.029	0
45	-3.000***	-1.067	-0.343	-0.343
50	-2.000**	-0.762	-0.686	0.343
55	-2.500**	-0.762	-0.343	-0.343
60	-3.000***	-0.762	-0.343	0
65	-2.000**	-0.457	-0.343	0.343
70	-3.000***	-0.762	-0.343	0.343
75	-2.500**	-0.457	-0.343	0
80	-2.500**	-0.762	-0.343	0
85	-2.500**	-0.762	0.000	-0.343
90	-3.000***	-0.762	0.000	-0.343
95	-3.000***	-1.067	-0.343	-0.686
100	-2.500**	-0.152	-0.343	0
105	-2.500**	-0.457	0.000	-0.343
110	-2.500**	-1.372	-0.686	-0.343
115	-2.500**	-1.067	-1.372	-0.343
120	-2.500**	-1.543	-1.372	-0.685
122	-2.933***	-1.234	-1.029	-0.343

Figure 1
CARs of CBs and EBs samples.

EBs: exchangeable issues, solid black line; CBs: discontinued black line; vertical axis: CARs: cumulative abnormal returns in decimal; horizontal axis: L2 window from *d*-17 to *d*+122; *d*: public announcement date of the issue.

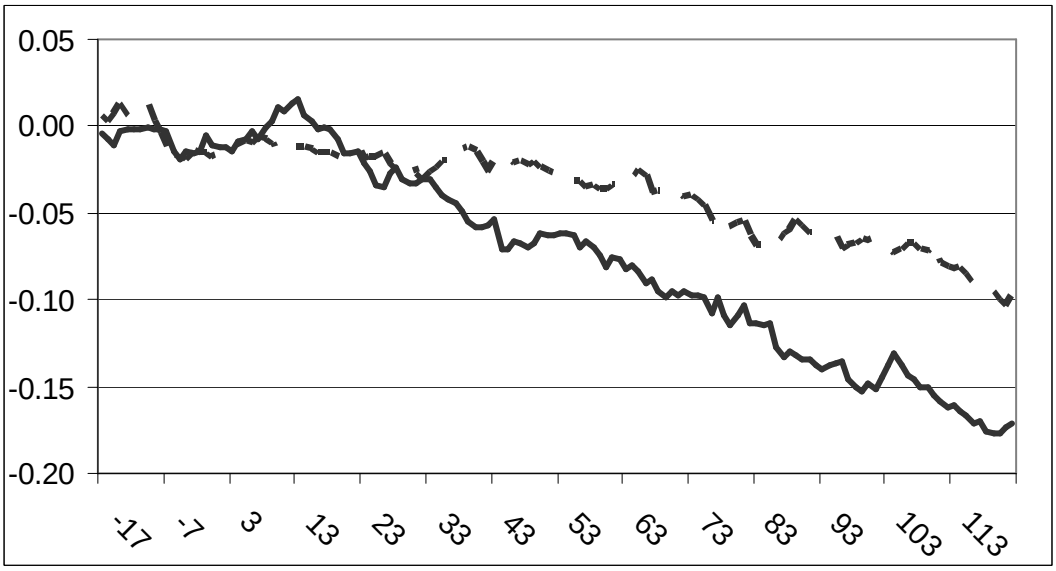
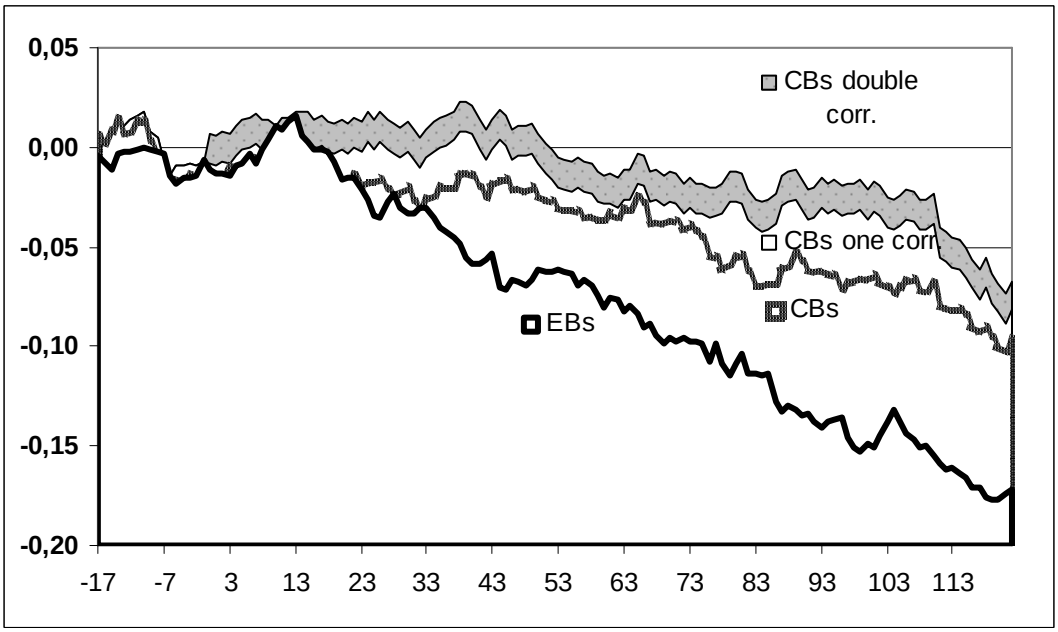


Figure 2
CARs of stocks for CBs and EBs samples with corrections

EBs: exchangeable bonds, solid black line; CBs: not corrected convertible bonds abnormal returns, discontinued grey line; CBs one corr.: CBs with a correction corresponding to the debt leverage effect, thin black line; CBs double corr.: CBs with a double correction of returns for the debt leverage and an assumed total dilution offset, thin black line above the grey area; grey area: difference of cumulative returns due to the total dilution hypothesis; vertical axis: CARs : cumulative abnormal returns in decimal; horizontal axis: L2 window from *d*-17 to *d*+122; d: public announcement date of the issue



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